AUSTRIA.

Not the least interesting or instructive part of my tour was the time spent in Austria, which was, strictly speaking, beyond the scope of my official tour, but where I received every attention, information, and assistance from the Baron Clummecky, chief of the Ministry of Agriculture, to whom I was introduced by our ambassador at Vienna, and Ober Forst Meister Tchuppitch, the head of the forest branch of the Agricultural Department.

Scientific forestry is not so far advanced in Austria as in Germany.

Transfer of the Forest Department to the Ministry of Agriculture, and re-organisation.

The department has recently been transferred from the Ministry of Finance to that of Agriculture; and Herr Tchuppitch was busily employed in preparing a scheme of re-organisation, which has, doubtless, since been introduced; and provides for the entertainment of a suitable staff of forest officers, with adequate salaries, to be divided into control and executive, with the requisite number of subordinates; the definition, and, where practical, the extinction of servitudes; and the more systematic conservancy and working to the best advantage of all the Government forests and communal woodlands under Government control.

By the introduction of these and similar measures there is no doubt that Austria will ere long possess a forest department on a par with those existing in other continental states, both as regards knowledge and organisation.

Area.

The State forests, notwithstanding the extensive sales which have taken place from time to time to meet State necessities, extend over an area of 1,784,037 Austrian *yochs*, equal to 2,230,046 English acres, of which 522,678 *yochs* (653,347 English acres) are classed as unproductive. This latter extent will probably be greatly reduced and brought under crop under the new *regime*, with a better knowledge of the resources and methods of culture of modern forest science.

Yield.

The *état* or estimated annual yield of this large area is given as 65,838,200 cubic feet of timber, firewood, &c.

Receipts and disbursements.

The budget for 1872 shows a gross income of 4,148,653 guldens, with an expenditure of 3,049,476 guldens, leaving upwards of 1,000,000 guldens (say 90,000*l.*) as clear profit to the State. The income is exhibited under three heads; 1. Sales of timber, firewood, &c.; 2. Renting of lands not covered with forest (this is a very small item); 3. Forest products and miscellaneous receipts. The Expenditure divides itself, as with us, into "Ordinary" and "Extraordinary," the former including, 1, Charges for felling and

transport of timber and charcoal, planting, repair of forest buildings; 2. Charges incurred on account of lands not covered with trees (a small item); 3. Charges for collection of forest produce, &c.; 4. Establishments; and, 5, Taxes and burdens for religious and educational purposes. Under extraordinary are classed purchase of lands, purchase and erection of new buildings, and extra establishments. The value of existing forest rights or servitudes is estimated at 530,711 guldens (say, 50,000*l.*) per annum.

The existing establishments are not uniform throughout the Empire, each of the 12 provinces or divisions of the empire having a separate organisation and establishments, differing widely in nomenclature, strength, duties, and emoluments. All that can therefore be stated on this subject is, that there are in all 1,170 *employés* on fixed salaries (amounting to 392,644 guldens per annum), and of this number 22 are Forstmeisters, or officials holding a corresponding position, in charge of divisions or circles. The extent of these circles and nature of the duties to be performed varies widely. Some are, I was told, almost sinecures, whilst in others there is work for six controlling officers instead of one, and it is much the same with the executive.

Forest academy at Mariabrunn.

The Austrian Forest Academy is situated at Mariabrunn, near Vienna. The course lasts three years, and there were, when I visited the institution, 35 students.

The museums or collections are particularly fine and interesting to the forester, particularly the sections known as "*Forst Betrieb*" and *Ingenieurs-Museum*. In the former are collected specimens of all instruments and appliances made use of in felling, squaring, sawing, carting, and preparing timber; models of saw mills, and machinery of all descriptions, from the rude and simple apparatus of former centuries, still in use in some of the remote mountain forests, to the more effective, but at the same time more complicated methods of modern times. Here are also plans of river beds improved and embanked for floating, sluices of all sorts, dams and weirs for directing rafts in their course and catching the firewood, which is floated in billets, accurate models of the rafts themselves, showing exactly how they are constructed, and specimens of timber of all sorts prepared in various ways, and containing many samples from foreign lands, not a few being from Madras and Ceylon, brought by the Austrian expedition which sailed round the world in the frigate "Novarra," three years ago; these last are only now being arranged, and there is some difficulty in mastering the nomenclature, which having only been noted in the vernacular is very confusing.

The damage done by animals and insects to timber trees is also exhibited here in a comprehensive manner; though in this the collection falls short of that at Neustadt-Eberswalde, which, however, it surpasses in other respects.

The value of such collections to the forest officer or student cannot well be over-rated, and I hope we may not be long in commencing their formation in Madras. In fact, no divisional or range office should be without one; this has, I am aware, been repeatedly enjoined, and a commencement was made in the Salem district; but it is impossible to expect much progress in this respect until adequate accommodation is provided at the head-quarters of each range and division.

There is also a forest or botanical garden attached to the academy for the instruction of the students.

The staff of the academy consists of the director, Herr Newald, to whom my best thanks are due for the attention and civility I received; seven professors, including one honorary teacher, and six assistant professors, with subordinates in the account office, laboratory, &c. There is also a forest school at Brühl, for training young men as practical foresters, which is under Herr Newald's supervision and the immediate charge of the local forest officer. The course extends over ten months, and there were eight young men going through it when I was there. Forest school at Brühl.

The training in both establishments is said to lean too much towards *theory* in comparison with *practice*, but this will doubtless also be improved under the new managements. I was astonished to find that the greater number of those trained in both institutions are intended for private and not Government service; their actual expenses for board and lodging being in many cases paid by noblemen and large proprietors, from whose estates they come, and to which they return as forest officers and workmen. The State defrays the expenses for the up-keep of the institutions, including salaries for the professors, &c., and there are no extra fees. This cannot fail to have a marked effect in tending towards the intelligent management of the private forests of the empire, which are very extensive. The absence of numerous candidates for the Government forest service, and preference evinced for private employment, is very noteworthy, especially when compared with the state of things in Prussia, Saxony, &c., where the number of aspirants for the Government service is out of all proportion to the annual number of vacancies. The irregularity of promotion, want of system, and lowness of the salaries in the Austrian service furnishes a ready explanation for the difference.

Districts visited.

I visited the forest reviers, Purkersdorf and Gablitz, with the Ober forst meister. The reviers form a portion of the large forest known as the *Wiener Wald*, which extends over an area of 60,000 English acres, and is of great value, being in the immediate vicinity of Vienna, which draws almost its whole supply of common building timber and firewood from it. It affords also a means of recreation, health, and enjoyment to the population of the capital, such as is possessed by the inhabitants of no other city in Europe, and the pleasure-loving Viennese are not slow in making use of its advantages, and pour out on Sundays and holidays from the hot and dusty town in large numbers.

The reviers visited consisted mainly of beech, which has been allowed to renew itself from time immemorial without any attempt at systematic management or rotation of crops. True the whole forest has been measured, valued, and mapped, but it is not divided into blocks, or worked regularly in periods, and I believe this is the case throughout its whole extent. The result is shown in a comparatively low and even decreasing yield per acre, and patchy or irregular appearance of the woods; and nothing but the naturally extreme richness and fertility of the soil, the fertilising qualities of the beech leaves, and comparatively limited demand and consequent felling until of late years, could have obviated a much worse state of things presenting themselves ere now.

As I have often found the case in India, a cursory glance at the forests from the outskirts or borders would lead one to suppose that it is fairly stocked with timber; but a more careful inspection proves that such is not the case, and that only in the valleys and more remote portions where the soil is particularly good, and the axe has not been so frequent in its inroads, is there a fair and regular crop. The gradual division and assortment of the area into blocks and periods, planting up of bare and insufficiently covered tracts, where natural reproduction is impossible from the absence of standard trees, and the introduction of a considerable percentage of *conifers* (e.g., *Pinus austriaca, Abies pectinata,* and *nobilis*), both on acount of exhaustion of the soil by successive crops of hardwood trees, and the quicker growth and greater money yield of the *coniferæ*, appear to be the principal points to be attended to, and which Herr Tchuppitch has in view.

I visited also the forest revier of Brühl, in the Mödling division, which has an area of 4,000 English acres, chiefly *Pinus austriaca* on one side of the valley, and beech in the other; the latter a good deal intermixed with ash and hard wood trees of inferior value, such as maple, plane, birch, &c. The black Austrian pine has a period of rotation (*umtriebs-*

zeit) of 100 to 120 years, growing slowly and with a tendency to branch. It has hitherto been the custom to tap the trees, about 15 to 20 years before they were to be felled, for the resin or turpentine which exudes, and from which the turpentine oil of commerce is procured. Such trees were leased out to contractors at an average of about 3*d.* per tree per annum, and one contractor has now 24,000 trees in the Mödling division on this system. The trees are tapped in spring, and grease giving sap in autumn. The method pursued in tapping and collecting the sap or resin is simple, but it would be of no practical benefit to describe it here; besides, it could probably be improved on, and experiments are even now about to be made on the French system, by which the sap is not so long exposed to the sun or atmosphere before being collected. There is at present a controversy going on as to the whole subject, *i.e.*, whether it pays or not to tap the trees, the old school maintaining that it does, the rates per tree being considerable, and the tree continuing to increase in growth. This last point is disputed by the opponents of the system, which will probably soon be put a stop to, as has been already done in the Black Forest in all but exceptional cases, the more so as the resin or turpentine cannot, strange to say, be brought into the market so cheaply as that imported from America. During the civil war in that country large stocks were tied up in the several harbours of the Southern States, and the price on the continent rose very greatly, only to fall suddenly on the close of the war, and ruin numbers of sanguine operators who had entered into large contracts, and taken large tracts of Austrian pine forests on lease.

Tapping of pines for turpentine.

The natural reproduction in this revier is very irregular. It is interesting to note that the sides of the hills with a western exposure are covered with pine, whilst on the opposite side hardwood, chiefly beech, predominates. Prince Lichtenstein is taking great pains and expending large sums of money in endeavouring to cover some low hills in the neighbourhood, which form part of his property, with pine trees. The soil, which consists chiefly of dolomite, is very unfavourable, and the prevailing high winds offer another obstacle, which renders the progress slow, and any adequate return from a financial point of view out of the question.

Most of the timber from the Mödling division is sold as firewood, divided into five classes according to description, each class being again divided into five sorts according to size, &c., the price varying from as much as 22 guldens for first class, first sort, to 2½ guldens last class, last sort, per klafter.

FORESTS OF THE PRINCE OF FURSTENBERG IN THE GRAND DUCHY OF BADEN (BLACK FOREST).

Area. The area of the Prince of Furstenberg's forests, under the charge of Oberforstrath Roth, is 80,617 Baden morgens, equal to about 72,555 English acres; and the annual yield is

Yield. estimated at 56,000 massenklafter, stated to be equal to about 5,443,200 cubic feet, being an average of 75 cubic feet per acre of forest; but I am inclined to think there must be some difference betwixt the Baden foot and ours, *vide* Statement at page 67.

Receipts and disbursements. This being a private estate, the annual receipts and disbursements and surplus cannot of course be given, but the Oberforstrath informed me that the forests were on the whole economically worked, and the liberal sums expended on road-making, improvement of the rivers for floating, housing, forest officers, &c. were well repaid by the facility of transport, and contentment and zeal of the employés. The forests are, in fact, worked for the best profit compatible with their retention as capital, and it is evident that a private individual is not burdened by considerations of policy and the good of the people at large to the same extent as a State or even a community.

Establishments. The forests of the estate are divided into 16 reviers, each under charge of a *Forstverwalter*, corresponding to the Oberförster of Prussia or Bavaria; and the whole upper establishments therefore consist of one Oberforstrath, and one Forstrath (councillor) at Donaueschingen, and 16 Forst verwalters in charge of the reviers.

Of the 16 reviers, six are situated in the valley of the Danube, and consist chiefly of beech forests; three extend south of Donaueschingen towards the Boden See (Lake of Constance), and contain mixed forests of hardwood and fir, whilst the remaining seven are in the Schwarz Wald (Black Forest), two in the northern and five in the southern portion, and may be said to consist entirely of coniferæ, *i.e.*, spruce (*Abies excelsa*), Scotch fir (*Pinus sylvestris*), silver fir (*Abies pectinata*), black Austrian (*Pinus austriaca*), and a little larch (*Larix europœa*).

I had an interview with Oberforstrath Roth at Donaueschingen, and received from him the general information I have just stated, and an introductory letter to Forst Verwalter Ganter at Rippoldsau, the revier mentioned in Dr Brandis' memorandum as being the most generally instructive.

The Rippoldsau revier is situated in the north-east corner of the Black Forest, "on the headwaters of one of the feeders "of the Kinzig river." Rippoldsau itself, where the Forst verwalter lives, and where there is a large hotel and mineral springs, is about 2,000 feet above the level of the sea. The area is 6,459 morgen (Baden), equal to 5,812 English acres, and presents a diversified appearance of hill and valley, the former running up to 3,250 feet above the sea, with their steep sides clothed from base to summit with spruce and silver fir, which are the predominating trees. The Rippoldsau Revier.

I remained 10 days at Rippoldsau, and inspected the several divisions of the forest, studying, at the same time, the general working plan and chart which the Forst verwalter placed at my disposal.

The main points deserving attention are, first, the peculiar character of the working or management as compared with the forests I had hitherto seen; second, the system of forest roads and transport of wood by land; third, the floating down the narrow mountain streams, and afterwards on the Kinzig river itself. The peculiarity of the working consists in the lengthened period over which the felling or clearing of a block extends. This is often as much as 40 years from first to last; in fact it is difficult in many instances to say when the block passes from one period (the oldest) to another (the youngest), so gradually is the old crop thinned out and removed. This method, which has long been more or less in force in the Black Forest, is now finding favour in other parts of Germany, as already noted in the Hanoverian and Saxon sections of this Report, as it is found preferable to the quick clearing, or "*kahl abtrieb*," formerly so much in vogue. It need scarcely be pointed out, however, that it requires much attention and intelligent treatment to ensure the success of such a system; for the seed will not germinate nor the seedlings flourish without a sufficiency of light, and the forest officer must be ever on the watch to see that they get it; and again, much greater care is necessary in felling and removing the old crop when the trees are already surrounded with saplings than when the seedlings of the new crop are not above one or two feet in height, and in this the axemen and foresters of the Black Forest are adepts; hence the damage done is really wonderfully slight, and a mere bagatelle compared with what it would be in less skilful hands. Peculiar features and system.

The turf and thick herbage is, as a rule, removed in patches in order to receive the seed and give it a fair chance of germinating and making its way, and the nature of the

herbage or undergrowth has not a little to say to the rate of clearing or quantity of light to be admitted in order to carry on the natural reproduction to the best advantage.

It may be said that a clearing which extends over 30 or 40 years differs little from the "Plänter-betrieb" already alluded to; and there are, doubtless, some analogous points, but the similarity vanishes when the matter is carefully looked into, and there are many differences in the details of the system, which, whilst they require to be seen to be noted and thoroughly understood, effectually separate the one treatment from the other.

Analogous system apparently suitable for Southern India.

A great deal must always depend upon the circumstances of climate, situation, and establishments available, but the gradual clearing, with an eye to natural reproduction in force in these forests, appears to me particularly applicable to our forests in southern India, provided we can organise and retain in a state of efficiency, 1st, reliable *employés* to watch each tract and ensure its treatment in a rational manner; and, 2nd, the workmen to fell and remove the old trees in anything like so careful a manner as those in the Black Forest. My own experience of our axemen and woodmen in India is certainly not favourable to our arriving at anything approaching to such a state of perfection; but I have not had to do with those in the Anamullays, who, I presume, are the best; and it has not hitherto been considered necessary to pay much attention to the matter, although each year its importance must become more manifest.

I was particularly struck with some "acquisitions" purchased by the Prince from peasants for 60,000 guldens (5,000*l.*), which are gradually being converted from "*Hack Wald*" into fine high timber forest of spruce and silver fir.

Hack Wald.

Hack Wald is a name given to a system formerly much in vogue in the Black Forest, and still pursued in remote, semi-civilized, and scantly-populated localities, and has some points of resemblance with our "kumari" or "ponakâd," except that the main desideratum appears to be, as a rule, wood, especially hazels and oziers for hoops of barrels, baskets, &c., and not a crop of grain. It consists in clearing the ground of the "jungle" every 16 to 20 years, cropping it for two years or more with grain or pulse, and allowing the coppice to grow up again. This treatment formed the subject of a very interesting discussion at the local forest gathering or "*Verein*" last year, in which, although the treatment, viewed from a forest light, was universally deprecated and condemned, many reasons were

Brought forward and explained to the meeting for its retention, in remote localities at least, for some years longer, as affording employment and a livelihood to a certain class.

The portion of the high marshy plateau of the Kniebis, included in the Rippoldsau revier, has now for the most part been drained and planted with spruce, which, considering the poorness of soil, exposure to high winds, and severe winters, is doing fairly well.

The *état* or yield of timber from the Revier for the decennial period from 1865 to 1875 has been fixed at 380,000 cubic feet, or an average of 65 cubic feet per acre annually. It is divided for purposes of sale into classes known as Holländer-Holz, Bau-Holz, Säge-Holz, and Gemein-Holz. The Holländer-Holz consists of the fine stems of from 60 to 85 feet in length, and 12 inches on the square, whilst the Gemein-Holz includes that under 18 feet in length, and 9 or 10 inches in diameter. The average prices vary from 8*d.* to 6*d.* per cubic foot, having fallen considerably of late owing to the occurrence of severe storms, which have blown down and thrown on the market large quantities of timber from these forests and others in the neighbourhood.

The right of pasture in the forests is, as a rule, leased out by the executive forest officer.

Forest roads.

The system of roads in the Rippoldsau forests appeared to me to approach very nearly to perfection, and the Forstverwalter is justly proud of what he has effected in this respect. I was fortunate enough not only to see those already in use, but several in course of construction. They may be divided into two classes, the first comprising roads 12 feet wide, and the second paths 6 to 8 feet wide. The former cost on an average nine guldens per rood of 10 feet, say 5*s.* per running yard, and the latter about two guldens per rood, say 1*s.* 1½*d.* per running yard; and it must be remembered that both are carefully laid out, and most substantially constructed with solid masonry, embankments, and culverts, wooden bridges, &c. There were 11,601 roods of such roads in the revier up to 1865, and 13,488 have to be constructed during the present period, *i.e.*, prior to 1875, making a total length of nearly five miles. Many of the paths are now being transformed into roads of 12 feet in breadth. It must be borne in mind that the Government high road (one of the finest I have ever seen) may be said to intersect the forest, otherwise a much greater length of purely forest roads would be necessary.

Timber slips.

In addition to the roads are the "*Riesen*" or slips, down which the timber is shot. The manner in which this is

effected requires almost to be seen to be understood, and unfortunately slipping was not going on when I was there. The method was, however, repeatedly explained to me, and I think I could apply it, though I fear it would only be practicable with pine trees stripped of their bark, or perhaps with the Australian *Eucalypti*. The paths down which the timber is slipped are about 6 feet wide, running along the sides of the hills, and not necessarily very steep. Small pieces of wood or rollers are generally placed along them crosswise at intervals of about 2 feet. When timber is to be slipped smooth pieces, stripped of their bark, are laid along on either side, so as to form a trough or slide, down which the other stems are then shot. It is astonishing what curves they will thus get round, and the facility and the rapidity with which the work can be effected may be imagined from the fact that 300 stems can, with ease, be slipped in one working day. Where the curve is too sharp for the tree to get round, a right or acute angle is preferred, and the stem which has been shot down the first portion, say with the narrow part first, is, without much trouble, by the aid of a wonderful and simple instrument, called a "krempe," sent on its way inverted, *i.e.*, with its broad end or base in front. When the stems which form the trough get dry they are oiled, and sometimes bark is strewn on the "road" to make it more slippery. In winter the snow is taken advantage of, and then only sides or walls to the trough are required to prevent the stem shooting off the road. There is, of course, a great deal of knack in the construction of the riesen and management of the slipping, and a Black Forest woodman appears to be able to put his logs where he likes; in one instance, which I saw, they were made to shoot over a road (the King's or Grand Duke's highway), a temporary bridge being formed, under which carts and foot travellers could pass, and jump a river or stream some 20 feet wide, down which they were afterwards floated in rafts 2,000 feet long!

Use of the *krempe*.

The *krempe*, alluded to above, is an instrument with a heavy iron head, something between an adze and a pick, and a longish curved wooden handle, which in the hands of a skilful woodman is most useful in moving stems, which it would be difficult otherwise to get hold of, far less to turn over or move as required. The curved handle gives great leverage, and the Black Forester is very expert in using the instrument, which is rarely out of his hands in the woods or on a raft, the sharp end being driven into the log by a smart blow in order to lay hold of and move it from one place to

another, or the broad thick end used as a hammer if required. I saw stems moved out of a clearing on to the road with comparative ease by half-a-dozen men provided only with krempes and a strong rope, for which we should have required elephants in Madras. The clearing was on the side of a steep rocky hill, and the trees of an average length of 50 feet were lying "higgledy-piggledy," with a young crop of from 8 to 15 years old coming up all round them, so that it seemed all but impossible to remove them at all without sawing them into pieces, and still more so without greatly damaging the young growth. As I have said, however, it was effected without any great damage or trouble.

Use of the sleigh for removing firewood billets.

There is also an excellent description of sleigh in use for bringing firewood billets down the steep hills. These are very simple of construction, and made up by the woodmen themselves, and it is marvellous to see mere boys walking up the steepest hills with the sleigh on their backs, and returning, dragging, or rather guiding, it after them with a load which no six men could carry; in fact, which could not be brought down the steep inclines in any other way. The sleigh is "dragged" as required by means of chains and bundles of firewood tied behind, in order to prevent its going too fast, and running away with its load and the man or boy who is guiding it in front.

Economical working of the forests.

It is by these and similar means that the Forst verwalter is enabled to fell, slip, and float his trees to depôt at a cost of 4 kreuzers—say 1½*d.* per cubic foot all round—and thus by selling at 6*d.* to 8*d.* per cubic foot realise a handsome profit, after paying all charges for supervision, planting, sowing, &c., &c.; and it is here, I think, that so much remains to be done by us in India, where the rates we now pay for felling and removing our timber, even in the rough and wasteful manner in which it is now done, are very high. Improvement in our means of communication, and introduction of and teaching the natives how to use better appliances for felling, and getting the logs out of the forests, and working them up when we have got them out, appear of paramount importance in our forest management.

Floating.

The cost of 4 kreuzers per cubic foot is divided into—felling 1 kreuzer, slipping 1¼, and floating 1¾ kreuzers. It is impossible to convey by words an idea of how the latter is carried on. It must be seen to be understood and believed, and I am not sanguine of its ever being introduced into our Indian forests, except in a very modified degree, and on the larger rivers; in fact, the high specific gravity of most of our woods, and torrent-like nature of our mountain streams,

preclude the idea in all but exceptional cases. Still it may not be without interest to state briefly how it is carried on here, even in quite small streams of from 15 to 20 feet in width. The streams invariably require to be prepared more or less for floating, that is cleared of any very large rocks or boulders, and "sleepered," if I may use the expression, with pieces of wood firmly fixed in the bed of the stream every few yards; in fact, in the same way as in the *Riesen*, except that the sleepers or rollers are much larger and placed further apart. These not only have the effect of preventing the formation of any very deep holes in the bed of the stream, but serve for the raft to slide along when it touches the bottom. Reservoirs for storing water are constructed in the same manner as I have described in the Report on Scotch Forests (page 108), as the floating cannot be carried on when the stream is in flood; in fact, the less water in it the better, so long as sufficient is stored up above to carry on the rafts. My first impression when I saw the *Floss* or float, consisting of stems from 20 to 60 feet in length tied together at the ends by branches or coir from the hazel, walnut, and silver fir, of which the hazel is preferred, and lying zig-zag in the bed of a mountain stream, up and down which they extended 1,600 feet, was that it was simply impossible that they could ever be floated, still less steered down the stream with all its windings and over the locks and rocks which occurred pretty frequently. This raft was not quite ready, and I had an opportunity of noting how it was constructed. It contained 880 stems, eight or ten of which abreast formed as it were a "link" in the long raft of 1,600 feet. There were about 30 links or rafts in the floss. They are not fastened laterally, only at both ends to the next link. The breadth is greatest at about two-thirds from the prow, which is quite narrow, and consists of only two or three stems abreast (in front of all is a piece formed of old wood and raised out of the water like the bow of a whale boat, so as to lead the raft), and the largest and heaviest stems are placed in the broadest part and toward the stem or hinder part, which does not taper at all. The fastenings are made very secure, but not too tight, as they must allow for play.

Preparation of the bed of the stream.

Construction of the rafts.

There are two or three *Bremsen*, or breaks, by which the speed is regulated and the float brought to a standstill if required, and the charge of the largest of those which is the farthest back is the most responsible post, and devolves on the float-master himself, or, in his absence, the most experienced hand. When all is ready the water from above is let loose, and the raft or rafts which have hitherto been lying in

the bed of the stream, which has probably not more than a foot of water in it, begins to float a little, but is not let go until about two-thirds of the water have passed, as it is a curious fact that when let go, if there is a steep fall in the river, it travels faster than the water, and has often to be stopped on its course to let the latter get ahead of it again. The raft is manned by eight or 10 men and boys, one or two of whom stand quite in the bow to guide the prow, the others make themselves generally useful, whilst at least one or two of the best hands stand by the float-master at the break, on which the safety and good guidance of the whole depends.

When let go it is exceedingly curious to see the forward part dart off at the rate of five or six miles an hour, and the several pieces or links which have been lying zig-zag and more or less high and dry gradually uncoil themselves and follow in its wake till the whole dashes along at a great speed and apparently uncontrolled. Accidents are, I believe, rare, but this can only result from the floaters being trained to the work from their youth up (I saw little lads of six and eight going down in miniature floats); as for one not accustomed to it, it is well nigh impossible to remain on the float at all, as it literally springs sometimes out of the water on touching a rock or obstruction, dashes round a rapid turn in the stream, or jumps over a weir or anicut, with a fall of several feet.

In this manner 40 or 50 miles can be got over in a day, if the stoppages, to allow of the water getting ahead, are not too frequent, or the stream does not become swollen by mountain rains. On reaching the main stream, in this instance, the Kinzig (the small stream is called the *Wolf*), the rafts are taken to pieces, and formed anew into those large rafts with which everyone is familiar who has travelled on the Rhine, the Main, the Elbe, or the Danube.

The raft which I saw was shorter, and contained a greater proportion of small stems than usual, being the last of the season. They are, as a rule, at least 2,000 feet long, contain 1,000 stems, and are manned by 12 men and boys. The broad portion is always made as broad as the river or stream, failing which there is a tendency to turn round, or get side on to the stream.

Many of the Black Forest floaters have been induced of late years to migrate to Hungary, in order to introduce the floating down the mountain streams into the large pine forests there. They receive very liberal wages as an inducement to go, but, as a rule, return after a year or two, and

complain bitterly of the climate, and laziness and want of aptitude of the "natives."

I trust the foregoing description of floating may serve to convey some idea of it to those who have not seen it, or have seen it only on large and comparatively slow flowing rivers; but, as I have said, it requires really to be seen to be understood and appreciated.

I do not know of any other points connected with forest management in the Rippoldsau revier which might with advantage be detailed here; so much is noted and learned by personal inspection and study of any occupation which cannot be put down in writing, or communicated to others except in the course of practical working; and particularly is this the case in the case of these forests, where there is little theory or scientific talk, but a thorough practical knowledge and experience of what to do and how to do it, rendering a visit particularly instructive to a forest officer.